GEOLOGICAL SURVEY OF WYOMING

USGS-OFR--83-4

TI84 901610

Subsurface temperatures in northeastern Wyoming measured by bottom hole temperature records

by

Kevin T. Kilty

Open File Report 83-4

Laramie, Wyoming
December, 1983

DISCLAIMER

CONTENTS

FIGURES

TABLES

Subsurface temperatures in northeastern Wyoming measured by bottom hole temperature records.

by

Kevin T. Kilty [1]

Introduction

This study began as a determination of the value of subsurface temperature data in investigating groundwater flow in northeastern Wyoming. The poor resolution of much of the temperature data set makes geohydrologic interpretations based on it inconclusive. However, the data are useful for estimating subsurface temperatures in geothermal assessments, correcting borehole and surface resistivity data, and calculating groundwater viscosity values in regional flow models. I present the data in two forms in this paper. Table 1 contains temperature-depth relationships for specific portions of the study area. Figure 1 is a contour map of geothermal gradients estimated from the subsurface temperature measurements.

Sources of data and corrections

In order to estimate temperature-depth relationships or geothermal gradients, one must have estimates of both surface and subsurface temperatures. Surface temperature data used in this study came from the compilation of Becker and Alyea (1964). Figure 2 shows their surface temperature data plotted against elevation of the recording stations. The mean surface temperature decreases with increasing distance north within the study area. The figure also indicates that the surface temperature decreases with increasing elevation, although not at the adiabatic lapse rate, as often

[1] 4610 Teller Street, Wheatridge, Colorado.

TABLE 1. Temperature-depth relationships

Location County-State	No. of points	Depth Range (meters)	Temperature-depth Coefficients*			Standard Error (°C)	Maximum Deviations (°C)
			a	$bx10^2$	$cx10^6$		
Natrona, WY	26	531-5470	6.7	4.2	-3.3	2.2	-10 -> +20
Weston, Niobrara, WY	43	874-3627	7.0	5.1	-4.9	1.6	-8 -> +14
Converse Campbell, WY	63	2585-5121	6.9	4.7	-3.1	1.3	-20 -> +24
Natrona, Johnson, WY	37	494-4820	7.3	4.2	-1.4	1.4	-13 -> +10
Campbell, WY	591	1195-3749	6.9	3.8	-1.4	0.5	-20 -> +22
Crook, WY	63	482-2541	5.9	5.2	-10.3	1.4	-22 -> +13
Johnson, Sheridan, WY	15	2348-3544	6.1	4.8	-4.8	4.1	-50 -> +25
Carter, MT	18	721-2736	6.2	4.6	-3.8	2.8	-20 -> +8
Big Horn, MT	13	1775-2633	7.0	5.6	-8.4	2.2	-20 -> +14
Powder River, MT	69	1243-2246	6.5	3.3	+1.1	0.9	-21 -> +25
Custer, Prairie, MT	12	1575-2988	6.5	4.2	-2.8	4.0	-15 -> +37
Harding, SD	35	961-2876	6.0	5.0	-3.2	1.5	-18 -> +15

*Temperature-depth relationship: $T(z) = a + bz + cz^2$, where z is depth in meters.

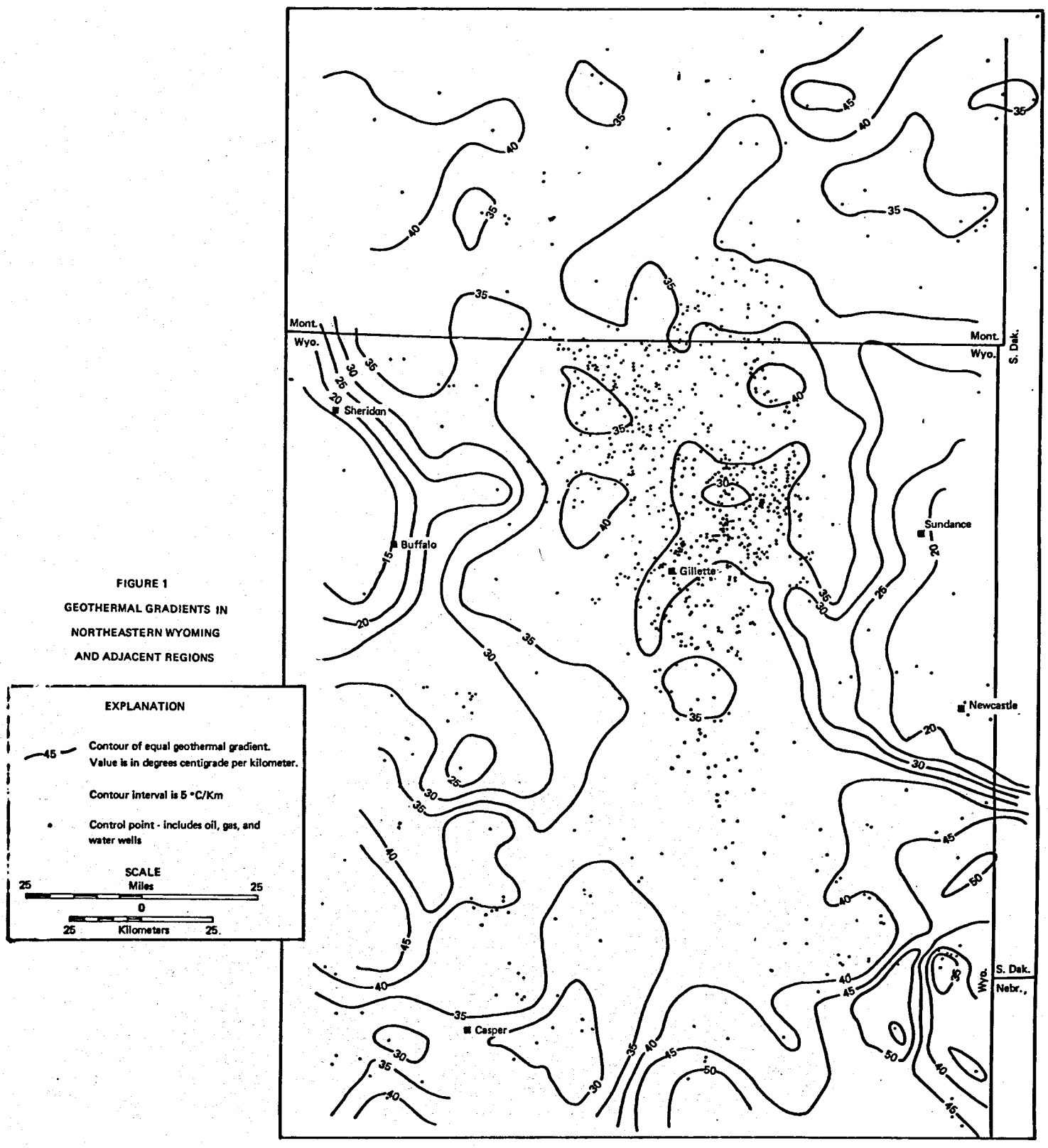

FIGURE 1

GEOTHERMAL GRADIENTS IN NORTHEASTERN WYOMING AND ADJACENT REGIONS

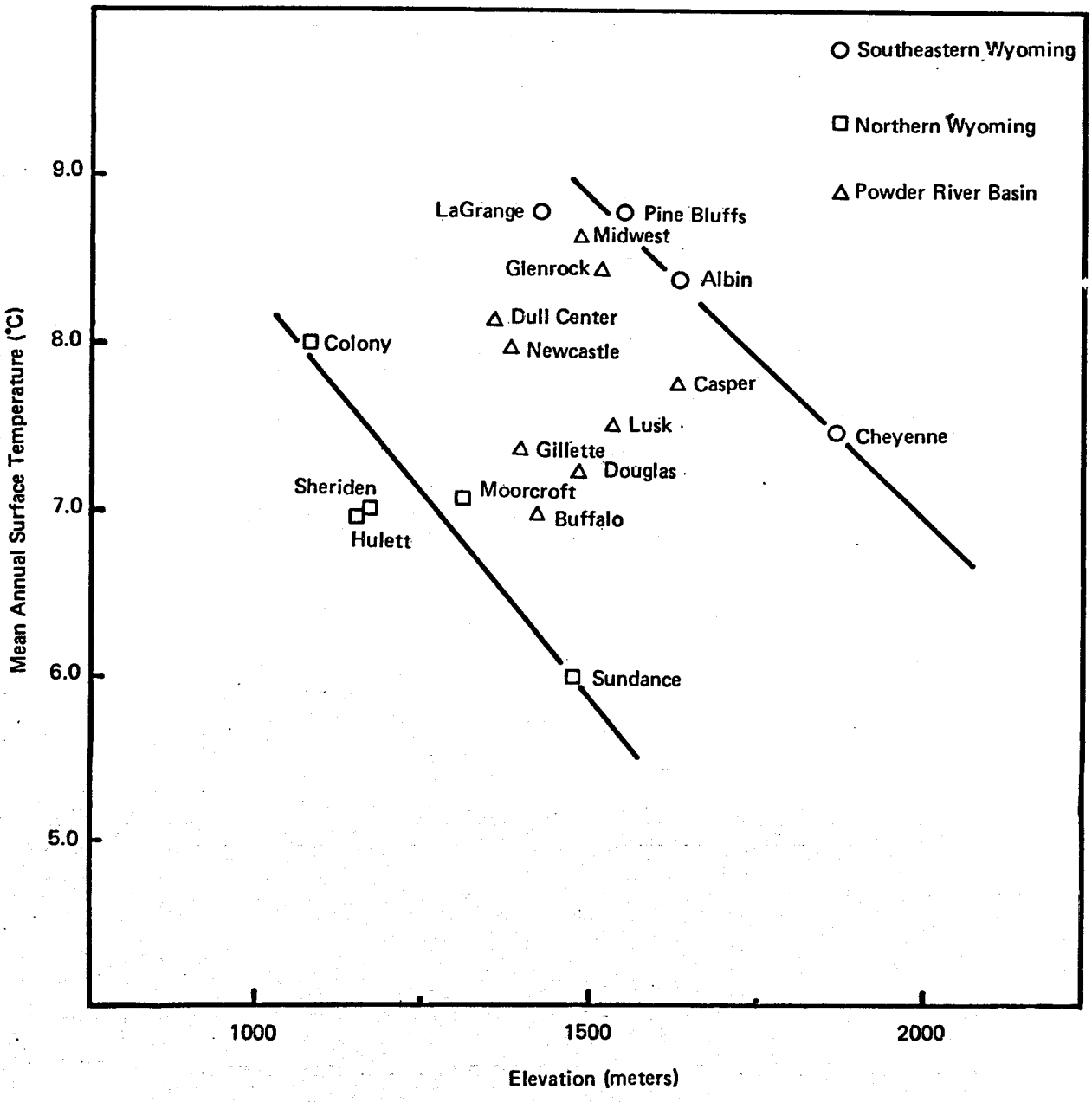

FIGURE 2 Mean Annual Surface Air Temperature Versus Elevation

assumed. One may use Figure 2 to estimate the surface temperature of a site on the basis of its elevation and location within the study area.

The subsurface temperature data includes approximately 1,000 bottom hole temperatures read from oil well and gas well headings on records at the Conservation Division of the U.S. Geological Survey in Casper, Wyoming, and at Petroleum Information Corporation in Denver, Colorado; approximately 50 temperature measurements made in water wells in Wyoming and South Dakota (Table 2); and a few temperature-depth curves from heat-flow studies in Wyoming and South Dakota (Table 3).

All of the subsurface temperature data contain random errors and the bottom hole temperatures contain both random and systematic errors. There are several means of correcting the systematic error in a bottom hole temperature. Chapman and Keho (1981) have described a correction method based on the information recorded on the well record heading, such as time since last circulation and total drilling time. A simpler correction method, described by Kehle (1972), was developed by members of the American Association of Petroleum Geologists, who found that the systematic error in a bottom hole temperature is highly correlated only with the depth of the borehole. Through empirical work, they determined a correction to be added to the bottom hole temperature recorded on the heading. The analytical form of this correction in degrees centigrade is:

$$\text{correction} = 7.6 + 6.3(d-1) - 1.4(d-1)(d-2) - 0.01(d-1)(d-2)(d-3).$$

Lower case "d" is the depth of the measurement in kilometers, and the correction is in degrees centigrade. As a test of the consistency of this correction method, I compared thermal gradients calculated from corrected temperatures taken at several different depths within the same borehole. The resulting gradients

TABLE 2. Geothermal gradients determined from Wyoming water well sample temperatures.

Well Location by State, County, Township, Range, and Section	Depth (meters)	Water Sample Temperature (°C)	Average Gradient K km^{-1}	Comments
Converse Co., WY 33 75 8dbb	2618	65.5	21.8	
Converse Co., WY 33 75 20aac	2790	64.5	20.1	
Converse Co., WY 33 76 16caa	2120	60.0	24.3	
Converse Co., WY 33 76 33cd	2673	58.5	18.7	
Crook Co., WY 52 63 25dc	342	9.5	9.0	Water is from Madison & Minnelusa Formations
Crook Co., WY 53 65 18bbd	409	15.0	20.8	
Johnson Co., WY 41 78 1bc	3054	93.5	28.3	
Johnson Co., WY 43 80 34dad	2743	79.5	26.4	
Johnson Co., WY 46 84 6ddd	0	6.0		Spring
Johnson Co., WY 49 83 27bdc	0	5.5		Spring
Natrona Co., WY 33 77 15bcb	2321	60.0	22.4	
Natrona Co., WT 39 78 26cdc	2188	88.0	36.6	
Natrona Co., WY 39 79 11aad	1734	82.0	42.7	
Natrona Co., WY 40 79 25caa	1341	79.0	52.9	Water is from Madison & Tensleep Formations
Natrona Co., WY 40 79 26caa	1448	84.0	52.5	

TABLE 2. - continued

Well Location by State, County, Township, Range, and Section	Depth (meters)	Water Sample Temperature (°C)	Average Gradient K km^{-1}	Comments
Natrona Co., WY 40 79 31bca	1876	72.0	34.1	
Natrona Co., WY 40 79 35ccc	1514	85.5	51.2	
Sheridan Co., WY 53 84 13ac	233	8.0	4.3	
Sheridan Co., WY 57 87 21db	486	10.0	6.2	
Weston Co., WY 44 60 5bb	396	14.0	15.2	
Weston Co., WY 45 61 20dca	804	26.0	22.4	
Weston Co., WY 45 61 28ab	835	26.0	21.6	
Weston Co., WY 45 61 29cbb	937	27.0	20.3	
Weston Co., WY 45 61 30adb	923	31.0	24.9	
Weston Co., WY 45 61 33ab	1088	21.5	12.4	
Weston Co., WY 46 60 31ba	359	16.0	22.3	
Weston Co., WY 46 62 18bdc	816	15.5	9.2	
Weston Co., WY 46 63 10dca	790	23.5	19.6	
Weston Co., WY 46 63 17cbc	1099	26.5	16.8	
Weston Co., WY 46 64 13cca	1378	37.0	21.0	

TABLE 2. - continued

Well Location by State, County, Township, Range, and Section	Depth (meters)	Water Sample Temperature (°C)	Average Gradient K km^{-1}	Comments
Weston Co., WY 46 65 20cdd	2472	69.0	24.7	
Weston Co., WY 46 65 23bad	2676	79.0	26.5	
Weston Co., WY 47 60 4ada	116	10.5	21.7	
Weston Co., WY 48 65 35ccb	973	28.0	20.6	

TABLE 3. Gradients determined from temperature logs in Wyoming.

Location and Identification	Depth Range (meters)	Least Square Gradient $K\ km^{-1}$	Average	Comments
Converse Co., WY 32-74-03bcd William Barber	34- 150	29.4	46.6	
Converse Co., WY 33-77-15bcb1 Terra Resources	100-2300	19.2	32.7	gradient determined between 1000-2300 meters depth
Crook Co., WY 57-65-15 Madison test hole-1	100-1100	26.8	46.4	gradient determined from log below casing at approximately 700 meters
Johnson Co., WY 49-83-27 NE-NW-SE Mobil 5a	30- 450	12.3	9.1	gradient from lower half only; temperature inversion to 175 meters depth
Niobrara Co., WY 36-62-28 NW-NE ETSI-0-1	180- 920	25.0	55.4	lower half of hole was used for gradient determination
Niobrara Co., WY 36-62-28 CNW ETSI-T-1	190- 430	80.0	97.6	
Niobrara Co., WY 36-62-21 SW-SE ETSI-0-5	175- 900	46.4	67.7	gradient determined between 400-900 meters depth

were within 2% of one another, whereas they were often more than 5% different without the correction.

The formula for computing a geothermal gradient is:

$$\text{Gradient} = (T_{corr} - T_s)/d$$

T_{corr} is the corrected bottom hole temperature, T_s is the surface temperature of the site, and d is the depth of the borehole.

The gradients computed through this equation are averaged to different depths. Because nearly all temperature-depth relationships have some curvature, averaging gradients to different depths will cause all of the gradients calculated from deep boreholes to be biased low or high, depending on the local curvature, when compared with the gradients calculated from shallow boreholes. Gradients can be adjusted to a common depth, D, using the equation:

$$\text{Adjusted gradient} = \text{Unadjusted gradient} - c^* (D-d)/2$$

D is the depth to which all the gradients are adjusted, d is the depth of the temperature measurement upon which the gradient is based, and c* is the curvature of the temperature-depth relationship appropriate to the area (c* = 2c on Table 1). See also Appendix A.

Curvature in a temperature-depth relationship may result from subsurface heat production, changes in thermal conductivity with depth, lateral changes in thermal conductivity, and groundwater flow. The only effect for which I have any quantitative data is the effect of subsurface radioactivity. Table 4 summarizes the subsurface heat production caused by radiocactivity at selected sites within the study area, and the curvature that would result from this heat production on a temperature-depth curve. The source of information in all cases is the natural gamma borehole log.

One may see that the curvature resulting from radioactive heat production

TABLE 4. Average radioactive heat-production and resulting temperature-depth curvature.

Site Location County-State	Depth Range (meters)	Radioactivity (mg Ra/ton)	Equivalent Heat Production (ergs/gm-yr)	Resulting Curvature ($°C/m^2$)
Harding, SD	1370-2700	4.95	260.5	-4.2×10^{-6}
Custer, Mt.	460-1920	5.80	305.7	-5.0×10^{-6}
Carter, MT	90-1500	4.80	253.0	-4.1×10^{-6}
Johnson, WY	30-460	6.00	316.2	-5.1×10^{-6}
Johnson, WY	1900-2770	4.00	210.0	-3.4×10^{-6}
Niobrara, WY	580-1070	6.00	316.2	-5.1×10^{-6}
Crook, WY	2200-2500	3.50	184.5	-3.0×10^{-6}
Campbell, WY	2150-3330	6.50	342.6	-5.6×10^{-6}

is approximately the same magnitude as the curvature actually found within portions of the study area (Table 1). However, these results are only approximate because of the large number of assumptions that go into calculating heat production from a gamma log value given in milligrams radium per ton. Furthermore, since one may expect that a combination of several processes determines the curvature, one should probably not use the curvature calculated from radioactivity alone, but the curvature calculated from the temperature measurements themselves, in making gradient corrections.

Geothermal gradient contours

Figure 1 shows contours of geothermal gradient, in degrees centigrade per kilometer, within the study area. The gradients shown here have all been adjusted to a common depth of one kilometer. The distribution of data used in producing the contours is also shown. It is a relatively uneven distribution. In some areas, particularly near the Bighorn Mountains, the contours are determined by only a few data values. Additional data in these areas might change the form of the contours substantially.

The median geothermal gradient in the study area is 36° C/km. Figure 3 shows a histogram of computed geothermal gradients within the study area. In general, the elevated areas surrounding the Powder River Basin and adjacent portions of the basin itself have lower than average gradients. This probably arises from two causes. First, the surface rocks in the elevated areas are older, more competent, and have a higher thermal conductivity than surface rocks in the rest of the study area. Second, the elevated areas receive more precipitation than, and form the groundwater recharge area for, the basin. The recharging groundwater absorbs some of the area's heat flow.

Higher than average gradients appear over the Casper Arch and Old Woman

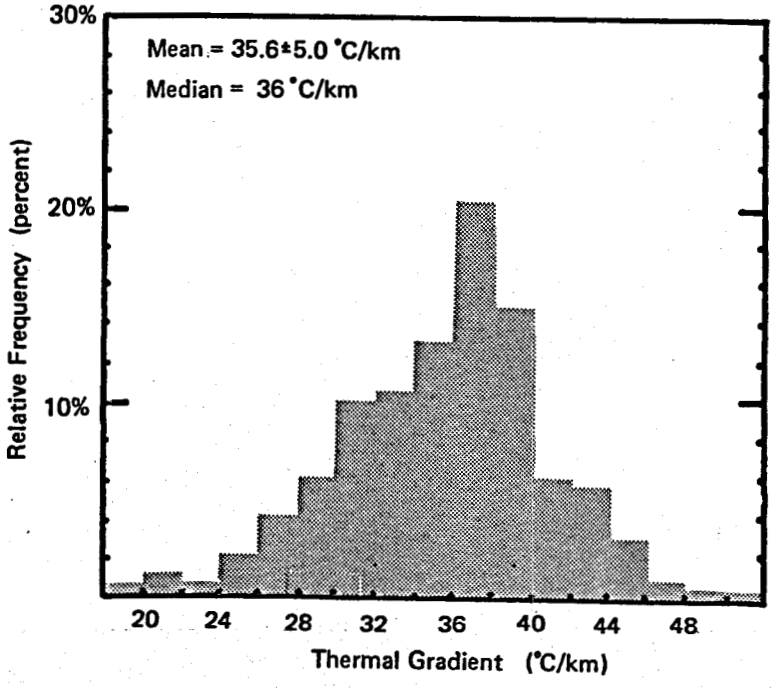

FIGURE 3 Histogram of Geothermal Gradients

Creek anticline. I have suggested (Kilty and Chapman, 1980) that these higher gradients may result from heat being transferred by regional groundwater flow over the anticlinal structures.

Polynomial temperature-depth relationships

Table 1 summarizes temperature-depth relationships for selected portions of the study area. The portion of the study area covered by a particular relationship was chosen in order to have a nearly constant surface geothermal gradient. Included in Table 1 are the locality over which the relationship holds, the number of values used in calculating the relationship, the depth range covered by the data values, the coefficients of the quadratic polynomial describing the relationship, the standard error involved in using this quadratic equation as the estimate, and the maximum deviations from this estimate that were noted in the observations. The relationships were determined by a least squares fit of the polynomial to the observations and should be valid from the ground surface to the maximum depth indicated by the depth range. Extrapolating much beyond this depth may result in substantial underestimates (overestimates in the case of Powder River County, Montana) of the subsurface temperature. As indicated by the goodness of fit (the square of the correlation coefficient), 50% to 95% of the variation of temperature with depth may be explained by these polynomial relationships. The remaining variation must be explained as resulting from local variations in geothermal gradient and random errors in the data.

References Cited

Becker, C.F., and Alyea, J.D., 1964. Temperature probabilities in Wyoming: University of Wyoming Agricultural Experiment Station Bulletin no.415.

Kehle, R.O., 1972. Geothermal survey of North America: American Association of Petroleum Geologists Annual Progress Report, 31 p.

Chapman, D.S., and Keho, T., 1981. Thermal resistance method of computing surface heat-flow and subsurface temperatures with application to the Uinta Basin of northeastern Utah: EOS, v.62, p.1022.

Kilty, K.T., and Chapman, D.S., 1980. Convective heat transfer in some selected geological situations: Groundwater, v.18, p.386-394.

APPENDIX A

Curvature on a temperature-depth relationship and the correction for it.

In a relationship of the form $T = T(z)$ curvature is defined as the quantity $(d^2T/dz^2) / (1+(dT/dz)^2)^{3/2}$. If the first derivation, dt/dz, is not large, as it never is in temperature-depth curves, the curvature is nearly equal to the second derivative itself. Thus:

$$\text{curvature} = d^2T/dz^2.$$

The governing differential equation of one-dimensional, steady heat conduction is $d^2T/dz^2 = q(z)$, where $q(z)$ is the heat production per unit volume divided by the thermal conductivity of the material. If $q(z)$ is equal to a constant, say c, the temperature-depth curve will have constant curvature in all depths.

Let us suppose that c is the constant heat production divided by thermal conductivity. The solution to the heat conduction equation is then $T(z) = T_o + Gz - (c/2)z^2$, where T_o is the surface temperature, and G is the surface gradient. Thus, one-half of the value of the constant c is equal to the quadratic coefficient in the temperature-depth relationship.

Suppose that one defines the geothermal gradient as I have in this manuscript. It will be a function of the depth, d, of the borehole in which the bottom hole temperature was measured:

$$\text{gradient} = \frac{Gd - (c/2)d^2}{d} = G - cd/2$$

Similarly, the average gradient to a different depth, D, is $G - cD/2$. The correction factor, or the difference between what should be two calculations of the same gradient, is $-c(D-d)/2$, which is the correction factor in the text.

APPENDIX B*

ATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 26
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 6.6996 B= 0.0420 C=-.0000328
TOTAL SUM OF SQUARES (SST)= 24333.9
SUM OF SQUARES DUE TO REGRESSION (SSR)= 23099.0
SUM OF SQUARES DUE TO DEVIATION (SSD)= 1234.9
VARIANCE OF TEMPERATURES= 1053.4
CORRELATION COEFFICIENT (R)= 0.9366
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.8772
RANGE OF DEPTHS IS 531.0 TO 5470.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
42.9659	106.0509	2576.	100.	93.	36.0	36.7
42.7607	106.0133	1674.	54.	68.	29.0	29.3
42.4121	106.2112	531.	31.	28.	51.0	50.8
42.2712	106.0949	881.	39.	41.	40.0	39.9
42.6958	106.7583	4202.	145.	125.	33.0	34.4
42.9653	106.0803	2603.	97.	94.	35.0	35.7
42.9830	106.1049	2573.	103.	93.	38.0	38.7
42.8410	106.7619	1031.	45.	46.	37.0	37.0
42.9004	106.0797	2251.	88.	85.	36.0	36.6
42.9069	106.1870	2036.	79.	79.	36.0	36.5
42.7098	106.1058	930.	47.	43.	44.0	44.0
42.6305	106.4951	1095.	38.	49.	30.0	30.0
42.9106	106.1040	2229.	97.	84.	41.0	41.6
42.9632	106.8769	958.	51.	44.	48.0	48.0
42.9836	106.9262	1080.	49.	48.	40.0	40.0
42.4931	106.2745	1003.	43.	45.	39.0	39.0
42.8391	106.8688	5470.	136.	138.	24.0	26.0
42.5748	106.6365	1065.	58.	48.	49.0	49.0
42.6436	106.7141	1692.	65.	68.	35.0	35.3
42.6454	106.7386	1301.	48.	56.	32.0	32.1
42.7044	106.8675	4105.	107.	124.	25.0	25.4
42.7560	106.6426	1454.	44.	61.	26.0	26.2
42.9032	106.0757	2406.	99.	89.	39.0	39.6
42.7016	106.8745	3764.	106.	118.	27.0	28.2
42.6771	106.8766	1893.	66.	74.	32.0	32.4
42.3151	106.0558	789.	34.	38.	38.0	37.9

* The detailed tabulations in Appendix B are organized in the same order as Table 1.

WESTON AND NIOBRARA COUNTIES, WYOMING

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 43
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 7.0493 B= 0.0511 C=-.00000485
TOTAL SUM OF SQUARES (SST)= 23136.0
SUM OF SQUARES DUE TO REGRESSION (SSR)= 18578.1
SUM OF SQUARES DUE TO DEVIATION (SSD)= 4557.9
VARIANCE OF TEMPERATURES= 550.9
CORRELATION COEFFICIENT (R)= 0.8961
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.8030
RANGE OF DEPTHS IS 874.0 TO 3627.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
43.3878	104.4036	1782.	81.	83.	41.0	41.3
43.3584	104.7916	2683.	98.	109.	34.0	34.7
43.1631	104.8823	2824.	99.	113.	33.0	33.7
43.2607	104.2393	1096.	60.	57.	48.0	48.0
43.4383	104.8172	2605.	105.	107.	38.0	38.6
43.3544	104.2296	874.	52.	48.	51.0	50.9
43.3079	104.8356	2749.	103.	111.	35.0	35.7
43.3770	104.4026	1760.	99.	82.	52.0	52.3
43.2819	104.7518	2522.	113.	105.	42.0	42.6
43.2518	104.6179	2395.	100.	102.	38.0	38.6
43.0245	104.4893	1233.	77.	63.	57.0	57.1
43.3697	104.3976	1822.	81.	84.	40.0	40.3
43.0858	104.8750	3053.	124.	118.	38.0	38.8
43.3004	104.3460	1644.	94.	78.	52.0	52.3
43.0328	104.6076	1935.	73.	88.	34.0	34.4
43.0190	104.7255	1423.	54.	70.	33.0	33.2
43.0485	104.7358	3627.	139.	129.	36.0	37.1
43.1530	104.5437	2391.	103.	102.	40.0	40.6
43.0390	104.2919	1269.	36.	64.	23.0	23.1
43.0439	104.6864	1842.	102.	85.	51.0	51.3
43.1155	104.4499	2022.	93.	91.	42.0	42.4
43.1226	104.4499	1444.	75.	71.	47.0	47.2
43.4739	104.9811	2729.	111.	110.	38.0	38.7
43.1335	104.4351	1512.	65.	73.	38.0	38.2
43.0886	104.9603	3228.	121.	121.	35.0	35.9
43.0406	104.0506	1276.	67.	64.	47.0	47.1
43.3538	104.9971	3040.	115.	118.	36.0	36.8
43.1598	104.6553	2510.	103.	105.	38.0	38.6
43.0224	104.7309	3375.	132.	124.	37.0	37.9
43.1555	104.5487	2934.	91.	115.	29.0	29.8
43.1961	104.4267	2360.	108.	101.	43.0	43.5
43.2097	104.4352	1623.	72.	77.	39.0	39.2
43.2367	104.5976	2290.	106.	99.	43.0	43.5
43.2427	104.2384	1173.	64.	60.	48.0	48.1
43.2463	104.2433	1173.	72.	60.	55.0	55.1
43.2955	104.7331	2538.	106.	106.	39.0	39.6
43.3052	104.4908	2046.	103.	91.	47.0	47.4

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
43.4547	104.6032	2149.	113.	94.	49.0	49.5
43.4585	104.6190	2169.	82.	95.	34.0	34.5
43.0835	104.2242	1210.	49.	62.	34.0	34.1
43.1733	104.5536	2378.	108.	101.	42.0	42.6
43.0360	104.6071	1446.	66.	71.	40.0	40.2
43.4383	104.3199	2190.	89.	96.	37.0	37.5

CONVERSE AND CAMPBELL COUNTIES, WYOMING

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 63
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 6.9348 B= 0.0466 C=-.00000357
TOTAL SUM OF SQUARES (SST)= 13043.9
SUM OF SQUARES DUE TO REGRESSION (SSR)= 6758.1
SUM OF SQUARES DUE TO DEVIATION (SSD)= 6285.8
VARIANCE OF TEMPERATURES= 210.4
CORRELATION COEFFICIENT (R)= 0.7198
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.5181
RANGE OF DEPTHS IS 2585.0 TO 5121.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
43.3603	105.5026	3688.	136.	130.	35.0	36.6
43.2782	105.2406	3420.	134.	124.	37.0	38.5
43.4668	105.2431	3216.	121.	120.	36.0	37.3
43.7107	105.4092	3208.	133.	120.	39.0	40.3
43.5642	105.1181	3073.	104.	116.	32.0	33.2
43.7130	105.1190	2819.	115.	110.	38.0	39.1
43.7214	105.3490	3128.	124.	118.	37.0	38.3
43.3800	105.2316	3242.	121.	120.	35.0	36.3
43.3368	105.1955	3219.	113.	120.	33.0	34.3
43.2263	105.8009	4414.	122.	143.	26.0	28.0
3.3628	105.0578	3019.	104.	115.	32.0	33.2
43.3762	105.2786	3353.	120.	123.	34.0	35.4
43.3474	105.6227	3963.	141.	135.	34.0	35.8
43.2307	105.8209	4250.	129.	140.	29.0	30.9
43.4636	105.1802	3033.	117.	115.	36.0	37.2
43.4046	105.6618	3947.	138.	135.	33.0	34.8
43.2825	105.5880	4514.	151.	144.	32.0	34.1
43.0031	105.0327	3395.	134.	124.	37.0	38.4
43.3910	105.2013	3215.	117.	120.	34.0	35.3
43.1541	105.9427	4452.	144.	144.	31.0	33.1
43.0866	105.7493	5121.	136.	152.	25.0	27.5
43.2402	105.1024	3247.	121.	121.	35.0	36.3
43.2778	105.5951	4017.	145.	136.	35.0	36.8
43.4328	105.8750	4281.	154.	141.	35.0	37.0
43.2461	105.8220	4279.	152.	141.	34.0	36.0
43.4773	105.8018	4113.	150.	138.	35.0	36.9
43.9812	105.1870	3119.	134.	117.	41.0	42.3
43.5452	105.2637	3183.	127.	119.	38.0	39.3
43.7348	105.1042	2622.	101.	105.	36.0	37.0
43.6892	105.1049	2783.	109.	109.	37.0	38.1
43.8016	105.2265	2786.	99.	109.	33.0	34.1
43.8849	105.5326	3210.	107.	120.	31.0	32.3
43.6387	105.2795	3046.	105.	116.	32.0	33.2
43.6674	105.1858	2835.	107.	110.	35.0	36.1
43.6673	105.4397	2990.	117.	114.	37.0	38.2
3.5182	105.2608	3097.	93.	117.	28.0	29.3
43.5320	105.2637	3097.	114.	117.	35.0	36.3
43.9967	105.6668	3216.	122.	120.	36.0	37.3
43.6300	105.4653	3344.	137.	123.	39.0	40.4

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
43.8478	105.3559	3463.	144.	125.	39.0	40.5
43.6264	105.3097	3103.	108.	117.	32.0	33.3
43.8705	105.5121	3187.	114.	119.	34.0	35.3
43.8515	105.2898	2861.	103.	111.	33.0	34.1
43.5547	105.2229	3168.	113.	119.	34.0	35.3
43.9607	105.4619	2939.	115.	113.	37.0	38.2
43.8696	105.4689	3146.	124.	118.	37.0	38.3
43.9951	105.1990	2585.	105.	103.	38.0	39.0
43.6283	105.1690	3070.	119.	116.	37.0	38.2
43.8510	105.6856	3476.	118.	126.	32.0	33.5
43.7829	105.4435	3255.	130.	121.	38.0	39.4
43.6779	105.3288	3566.	125.	128.	33.0	34.5
43.9287	105.2992	3242.	109.	120.	31.0	32.3
43.7794	105.2785	2943.	119.	113.	38.0	39.2
43.7351	105.3278	3002.	125.	115.	39.0	40.2
43.8140	105.3872	3048.	106.	116.	33.0	34.2
43.7495	105.3393	2999.	112.	115.	35.0	36.2
43.7424	105.3395	3068.	122.	116.	38.0	39.2
43.6605	105.2193	2967.	118.	114.	37.0	38.2
43.6090	105.2396	3152.	112.	118.	33.0	34.3
43.9509	105.2785	3200.	103.	119.	30.0	31.3
43.7795	105.2641	3388.	127.	124.	35.0	36.4
43.9404	105.5510	3658.	139.	130.	36.0	37.6
43.6084	105.3046	3781.	126.	132.	32.0	33.7

NATRONA AND JOHNSON COUNTIES, WYOMING

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 37
QUADRATIC LEAST SQUARES COEFFICIENTS ARE,
A= 7.3047 B= 0.0416 C=-.00000309
TOTAL SUM OF SQUARES (SST)= 42243.7
SUM OF SQUARES DUE TO REGRESSION (SSR)= 39766.0
SUM OF SQUARES DUE TO DEVIATION (SSD)= 2477.7
VARIANCE OF TEMPERATURES= 1173.4
CORRELATION COEFFICIENT (R)= 0.9702
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.9413
RANGE OF DEPTHS IS 494.0 TO 4820.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
43.3207	106.8507	732.	41.	36.	49.0	48.9
43.1228	106.2692	2627.	83.	95.	29.0	29.7
43.1668	106.1494	2728.	99.	98.	34.0	34.7
43.1739	106.2139	2188.	91.	84.	39.0	39.5
43.8450	106.6725	2539.	77.	93.	28.0	28.6
43.5762	106.1097	4728.	125.	135.	25.0	26.5
43.9224	106.0502	3719.	127.	119.	32.0	33.1
43.5048	106.3276	2012.	86.	79.	39.0	39.4
43.6219	106.3691	2261.	37.	86.	13.0	13.5
43.6407	106.6902	793.	36.	38.	38.0	37.9
43.6632	106.5761	1585.	61.	66.	34.0	34.2
43.7064	106.5966	2072.	81.	80.	36.0	36.4
43.7947	106.3231	4770.	138.	135.	27.0	28.5
43.8383	106.6688	2583.	83.	94.	30.0	30.6
43.8516	106.3153	4595.	136.	133.	28.0	29.4
43.8100	106.3600	4642.	134.	134.	27.0	28.5
43.8519	106.3352	4820.	133.	136.	26.0	27.5
43.8719	106.5319	4738.	142.	135.	28.0	29.5
43.7683	106.4284	4740.	136.	135.	27.0	28.5
43.8365	106.3354	4578.	133.	133.	27.0	28.4
43.7100	106.6025	1821.	72.	73.	36.0	36.3
43.2024	106.3098	1977.	90.	77.	43.0	43.4
43.0114	106.1431	2804.	99.	100.	33.0	33.7
43.1674	106.2320	2169.	81.	83.	34.0	34.5
43.1840	106.9441	1570.	70.	65.	41.0	41.2
43.0952	106.6667	1372.	76.	59.	51.0	51.1
43.2083	106.1658	1938.	90.	76.	44.0	44.4
43.1750	106.1997	2224.	90.	85.	38.0	38.5
43.4384	106.6248	987.	42.	45.	36.0	36.0
43.4322	106.2298	2144.	93.	82.	41.0	41.5
43.8447	106.3272	4666.	133.	134.	27.0	28.5
43.8707	106.5235	4613.	142.	133.	29.0	30.4
43.8517	106.3958	4669.	131.	134.	27.0	28.5
43.2143	106.1694	1842.	87.	73.	44.0	44.3
43.1807	106.2944	2052.	81.	80.	37.0	37.4
43.4306	106.6274	978.	42.	45.	37.0	37.0
43.3207	106.8507	494.	30.	27.	50.0	49.8

CAMPBELL COUNTY, WYOMING

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 591
QUADRATIC LEAST SQUARES COEFFICIENTS ARE:
A= 6.8537 B= 0.0382 C=-.00000141
TOTAL SUM OF SQUARES (SST)= 183799.0
SUM OF SQUARES DUE TO REGRESSION (SSR)= 92978.0
SUM OF SQUARES DUE TO DEVIATION (SSD)= 90821.0
VARIANCE OF TEMPERATURES= 311.5
CORRELATION COEFFICIENT (R)= 0.7112
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.5059
RANGE OF DEPTHS IS 1195.0 TO 3749.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.5185	105.5845	2416.	98.	91.	37.0	37.9
44.4839	105.6610	2547.	101.	95.	37.0	38.0
44.2300	105.6395	2937.	109.	107.	35.0	36.3
44.5422	105.4878	2245.	91.	85.	37.0	37.8
44.0428	105.4052	3261.	122.	116.	35.0	36.5
44.5005	105.0095	2154.	65.	83.	27.0	27.8
44.5440	105.0469	1837.	65.	72.	31.0	31.5
44.4822	105.0305	2280.	78.	87.	31.0	31.8
44.4896	105.0498	2271.	70.	86.	28.0	28.8
44.4715	105.0668	2301.	75.	87.	29.0	29.8
44.4789	105.0257	2256.	65.	86.	26.0	26.8
44.4513	105.0020	2119.	72.	81.	30.0	30.7
44.4569	105.0361	2217.	79.	85.	33.0	33.8
44.4393	105.0009	2168.	70.	83.	29.0	29.8
44.5005	105.0095	2154.	65.	83.	27.0	27.8
44.5440	105.0469	1837.	65.	72.	31.0	31.5
44.4822	105.0305	2280.	78.	87.	31.0	31.8
44.4896	105.0498	2271.	70.	86.	28.0	28.8
44.4715	105.0668	2301.	75.	87.	29.0	29.8
44.4789	105.0257	2256.	65.	86.	26.0	26.8
44.4513	105.0020	2119.	72.	81.	30.0	30.7
44.4569	105.0361	2217.	79.	85.	33.0	33.8
44.4200	105.0709	2432.	82.	91.	31.0	31.9
44.4393	105.0009	2168.	70.	83.	29.0	29.8
44.3363	105.0704	2376.	70.	90.	26.0	26.9
44.3760	105.0048	1838.	59.	72.	28.0	28.5
44.5287	105.0630	2216.	80.	85.	33.0	33.8
44.5897	105.0527	2153.	90.	83.	38.0	38.7
44.5285	105.0460	2222.	79.	85.	32.0	32.8
44.7944	105.0491	1622.	73.	65.	40.0	40.4
44.7931	105.0612	1629.	76.	65.	42.0	42.4
44.3540	105.0397	2304.	64.	87.	25.0	25.8
44.4478	105.0745	2318.	72.	88.	28.0	28.9
44.4333	105.0390	2271.	56.	86.	21.0	21.8
44.3900	105.0299	1801.	56.	71.	27.0	27.5
44.4235	105.0306	2301.	65.	87.	25.0	25.8
44.4447	105.0454	2259.	63.	86.	25.0	25.8

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.7514	105.8814	2437.	112.	92.	43.0	43.9
44.3633	105.6549	2790.	92.	102.	31.0	32.2
44.6365	105.6791	2446.	101.	92.	38.0	38.9
44.5127	105.5997	2459.	103.	92.	39.0	39.9
44.8583	105.7514	2727.	117.	101.	40.0	41.1
44.2023	105.6455	3002.	117.	109.	37.0	38.3
44.2499	105.5794	2804.	99.	103.	33.0	34.2
44.9839	105.4396	1814.	61.	71.	29.0	29.5
44.9375	105.8639	2316.	93.	88.	37.0	37.9
44.6073	105.5778	2312.	96.	88.	38.0	38.9
44.8017	105.6111	2231.	92.	85.	38.0	38.8
44.2380	105.7241	3020.	115.	109.	36.0	37.3
44.0023	105.1977	2576.	107.	96.	39.0	40.0
44.8490	105.5700	2128.	83.	82.	36.0	36.7
44.2756	105.2397	2713.	98.	100.	33.0	34.1
44.4187	105.1534	2453.	87.	92.	32.0	32.9
44.2384	105.6754	2986.	91.	108.	28.0	29.3
44.4023	105.3505	2260.	67.	86.	26.0	26.8
44.7178	105.6424	2298.	91.	87.	36.0	36.8
44.7695	105.4731	2104.	83.	81.	36.0	36.7
44.4681	105.3746	2228.	87.	85.	36.0	36.8
44.2416	105.6902	2996.	112.	109.	35.0	36.3
44.6981	105.5445	2115.	86.	81.	37.0	37.7
44.8260	105.4693	2019.	82.	78.	37.0	37.7
44.5757	105.0945	2223.	55.	85.	22.0	22.8
44.5328	105.0983	2287.	78.	87.	31.0	31.8
44.8003	105.8914	2484.	96.	93.	36.0	37.0
44.4654	105.6654	2592.	110.	96.	39.0	40.0
44.1428	105.4154	3173.	115.	114.	34.0	35.4
44.3551	105.2991	2816.	91.	103.	30.0	31.2
44.5034	105.1025	2242.	81.	85.	33.0	33.8
44.3489	105.3297	2825.	94.	104.	31.0	32.2
44.6810	105.5396	2136.	85.	82.	36.0	36.7
44.6961	105.6723	2366.	92.	89.	36.0	36.9
44.1186	105.5116	3328.	112.	118.	32.0	33.5
44.4687	105.5238	2952.	103.	107.	32.0	33.3
44.4059	105.0159	2185.	72.	84.	30.0	30.8
44.1977	105.0746	2496.	104.	93.	39.0	40.0
44.5511	105.0420	2256.	62.	86.	24.0	24.8
44.5511	105.0420	2256.	62.	86.	24.0	24.8
44.6966	105.8627	2545.	93.	95.	34.0	35.0
44.4138	105.2348	2506.	102.	94.	37.0	38.0
44.2788	105.3103	2865.	99.	105.	32.0	33.2
44.4276	105.3108	2690.	106.	99.	37.0	38.1
44.2800	105.1878	2598.	97.	97.	35.0	36.0
44.5627	105.3070	2390.	94.	90.	36.0	36.9
44.8198	105.0904	1698.	83.	68.	45.0	45.5
44.4739	105.9765	3091.	125.	111.	38.0	39.4
44.8266	105.6711	2304.	79.	87.	31.0	31.8
44.9148	105.7166	2223.	95.	85.	39.0	39.8
44.9770	105.6989	2249.	81.	86.	33.0	33.8
44.6334	105.7478	2582.	100.	96.	36.0	37.0
44.6516	105.7629	2683.	90.	99.	31.0	32.1
44.9411	105.3679	1800.	101.	71.	51.0	51.5

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.4068	105.2757	2582.	90.	96.	32.0	33.0
44.4700	105.1632	2381.	75.	90.	28.0	28.9
44.4884	105.1227	2323.	88.	88.	35.0	35.9
44.4959	105.1420	2275.	85.	86.	34.0	34.8
44.5045	105.4490	2774.	98.	102.	33.0	34.2
44.5231	105.4734	3031.	108.	110.	33.0	34.3
44.5277	105.2460	2387.	108.	90.	42.0	42.9
44.5493	105.2610	2376.	89.	90.	34.0	34.9
44.5575	105.1241	2310.	80.	88.	31.0	31.9
44.5641	105.2107	2326.	95.	88.	38.0	38.9
44.5851	105.2263	2307.	86.	87.	34.0	34.8
44.5861	105.1497	2227.	79.	85.	32.0	32.8
44.5933	105.1447	2211.	84.	84.	35.0	35.8
44.6301	105.1917	2276.	66.	86.	26.0	26.8
44.6354	105.3686	2441.	90.	92.	34.0	34.9
44.6444	105.1305	1774.	64.	70.	32.0	32.5
44.6502	105.3388	2337.	105.	88.	42.0	42.9
44.0667	105.2680	2977.	120.	108.	38.0	39.3
44.0702	105.2780	3077.	122.	111.	37.0	38.4
44.0828	105.1981	2840.	124.	104.	41.0	42.2
44.0845	105.3494	3127.	126.	113.	38.0	39.4
44.1226	105.2016	2928.	64.	107.	19.0	20.3
44.1265	105.1867	2829.	119.	104.	40.0	41.2
44.1337	105.1815	2761.	106.	102.	36.0	37.1
44.1411	105.1934	2799.	121.	103.	41.0	42.2
44.1537	105.3400	3010.	119.	109.	37.0	38.3
44.1647	105.3302	3078.	133.	111.	41.0	42.4
44.1859	105.1316	2630.	85.	98.	29.0	30.1
44.2000	105.1517	2621.	120.	97.	43.0	44.1
44.2169	105.7201	3525.	136.	124.	37.0	38.6
44.2164	105.2438	2841.	88.	104.	28.0	29.2
44.2184	105.3749	3025.	114.	110.	35.0	36.3
44.2300	105.3048	2555.	149.	104.	50.0	51.2
44.2325	105.3700	2947.	113.	107.	36.0	37.3
44.2328	105.3798	3007.	115.	109.	36.0	37.3
44.2368	105.3700	2999.	100.	109.	31.0	32.3
44.2372	105.3149	2832.	96.	104.	31.0	32.2
44.2429	105.4801	3171.	120.	114.	36.0	37.4
44.2446	105.3152	2875.	132.	105.	43.0	44.2
44.2502	105.1827	2654.	88.	98.	30.0	31.1
44.2950	105.1625	2521.	88.	94.	32.0	33.0
44.2959	105.1123	2479.	87.	93.	32.0	33.0
44.2967	105.4155	2991.	97.	108.	30.0	31.3
44.3008	105.3658	2448.	83.	92.	31.0	31.9
44.3097	105.1629	2541.	90.	95.	33.0	34.0
44.3122	105.6474	3330.	139.	118.	40.0	41.5
44.3177	105.0970	2480.	66.	93.	24.0	25.0
44.3178	105.0853	2465.	76.	92.	28.0	29.0
44.3283	105.1626	2510.	119.	94.	45.0	46.0
44.3309	105.3380	2865.	123.	105.	41.0	42.2
44.3140	105.0909	2434.	65.	91.	24.0	24.9
44.2779	105.1228	2490.	102.	93.	38.0	39.0
44.8686	105.7341	2335.	91.	88.	36.0	36.9
44.8391	105.9232	2934.	92.	107.	29.0	30.3

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.9882	105.1030	1417.	51.	58.	31.0	31.3
44.1548	105.8162	3212.	121.	115.	36.0	37.4
44.9442	105.6018	2183.	78.	84.	32.0	32.8
44.4663	105.0993	2321.	79.	88.	31.0	31.9
44.4560	105.1742	2385.	73.	90.	27.0	27.9
44.8404	105.7559	2827.	100.	104.	33.0	34.2
44.3456	105.1940	2605.	83.	97.	29.0	30.0
44.6146	105.2626	2329.	90.	88.	35.0	35.9
44.5884	105.2566	2331.	81.	88.	31.0	31.9
44.5825	105.2481	2347.	94.	89.	37.0	37.9
44.0577	105.4612	3327.	125.	118.	35.0	36.5
44.3886	105.2809	2618.	94.	97.	33.0	34.1
44.5670	105.2363	2340.	82.	89.	32.0	32.9
44.5131	105.2328	2343.	78.	89.	30.0	30.9
44.0580	105.4518	3285.	128.	117.	37.0	38.5
44.5456	105.2207	2329.	76.	88.	29.0	29.9
44.3785	105.1747	2484.	76.	93.	28.0	29.0
44.6141	105.2827	2256.	97.	86.	39.0	39.8
44.3929	105.1850	2456.	74.	92.	27.0	27.9
44.4185	105.2667	2585.	78.	96.	27.0	28.0
44.5522	105.3170	2448.	89.	92.	33.0	33.9
44.6212	105.2625	2312.	89.	88.	35.0	35.9
44.3597	105.2339	2587.	95.	96.	34.0	35.0
44.3629	105.2394	2619.	80.	97.	28.0	29.1
44.0097	105.2380	3114.	125.	112.	38.0	39.4
44.9973	105.1185	1389.	59.	57.	37.0	37.3
44.6689	105.2356	1741.	83.	69.	43.0	43.5
44.6717	105.4917	2685.	118.	99.	41.0	42.1
44.7014	105.3394	2295.	101.	87.	41.0	41.8
44.7565	105.1239	2171.	84.	83.	35.0	35.8
44.7592	105.3705	2328.	74.	88.	28.0	28.9
44.8284	105.1318	1946.	86.	76.	40.0	40.6
44.8463	105.3959	2387.	107.	90.	42.0	42.9
44.8667	105.1365	1701.	82.	68.	44.0	44.5
44.8828	105.1544	1722.	62.	68.	32.0	32.5
44.8970	105.1535	1195.	61.	50.	45.0	45.1
44.9221	105.1689	1851.	76.	73.	37.0	37.6
44.9297	105.4695	2370.	91.	89.	35.0	35.9
44.0747	105.2845	3039.	130.	110.	40.0	41.3
44.6434	105.3237	2309.	98.	88.	39.0	39.9
44.2605	105.2856	2847.	80.	104.	26.0	27.2
44.3490	105.1889	2606.	73.	97.	25.0	26.0
44.2498	105.4752	3136.	94.	113.	28.0	29.4
44.3715	105.1632	2452.	72.	92.	27.0	27.9
44.5817	105.2668	2333.	93.	88.	37.0	37.9
44.3375	105.5016	3030.	134.	110.	42.0	43.3
44.7818	105.2116	2131.	88.	82.	37.0	37.7
44.3251	105.1134	2461.	69.	92.	25.0	25.9
44.4072	105.2661	2568.	112.	96.	41.0	42.0
44.5384	105.2258	2319.	75.	88.	29.0	29.9
44.4599	105.1642	2409.	75.	91.	28.0	28.9
44.4604	105.1284	2320.	75.	88.	29.0	29.9
44.1076	105.2231	2918.	119.	106.	38.0	39.2
44.4039	105.2611	2533.	86.	95.	31.0	32.0
44.4849	105.2298	2408.	73.	91.	27.0	27.9
44.5815	105.2570	2330.	94.	88.	37.0	37.9

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.8631	105.8995	2408.	93.	91.	36.0	36.9
44.6152	105.1960	2307.	93.	87.	37.0	37.8
44.3552	105.5097	3002.	117.	109.	37.0	38.3
44.7054	105.6382	2277.	94.	87.	38.0	38.8
44.5273	105.6855	2566.	102.	96.	37.0	38.0
44.8489	105.5630	2115.	91.	81.	39.0	39.7
44.9613	105.6105	2117.	86.	81.	37.0	37.7
44.9875	105.4696	1860.	83.	73.	40.0	40.6
44.4351	105.4072	2301.	89.	87.	36.0	36.8
44.3507	105.3810	2355.	94.	89.	37.0	37.9
44.3217	105.4963	2511.	108.	94.	40.0	41.0
44.4497	105.3253	2644.	93.	98.	32.0	33.1
44.6233	105.7684	2532.	104.	95.	36.0	39.0
44.8696	105.6460	2144.	90.	82.	38.0	38.7
44.6474	105.0948	2171.	86.	83.	36.0	36.8
44.5997	105.2723	2302.	94.	87.	37.0	37.8
44.8246	105.0793	1722.	85.	68.	45.0	45.5
43.9429	105.5402	3104.	99.	112.	30.0	31.4
43.9575	105.3797	3327.	104.	118.	29.0	30.5
44.3113	105.4755	2512.	97.	94.	36.0	37.0
44.8390	105.9663	2601.	100.	97.	35.0	36.0
44.9649	105.6055	2161.	88.	83.	37.0	37.8
44.8988	105.3338	1707.	75.	68.	39.0	39.5
44.8800	105.8787	2286.	93.	87.	37.0	37.8
44.6947	105.6229	2277.	95.	87.	38.0	38.8
44.2992	105.7761	2930.	117.	107.	38.0	39.3
44.3632	105.3409	2821.	98.	103.	32.0	33.2
44.9873	105.5072	1931.	89.	75.	42.0	42.6
44.5402	105.5408	2393.	86.	90.	33.0	33.9
44.9623	105.4701	1958.	84.	76.	39.0	39.6
44.7946	105.5704	2220.	90.	85.	37.0	37.8
44.7462	105.7039	2390.	78.	90.	30.0	30.9
44.3366	105.4411	2446.	107.	92.	41.0	41.9
44.1694	105.3155	3015.	102.	109.	31.0	32.3
44.3840	105.2654	2618.	83.	97.	29.0	30.1
44.3129	105.1376	2484.	73.	93.	26.0	27.0
44.5956	105.2111	2307.	85.	87.	34.0	34.8
44.5558	105.2813	2340.	89.	89.	34.0	34.9
44.1577	105.4262	3158.	127.	113.	38.0	39.4
44.0963	105.5002	3318.	103.	118.	29.0	30.5
44.7662	105.8176	2402.	102.	90.	39.0	39.9
44.9441	105.7383	2325.	82.	88.	32.0	32.9
44.2686	105.1689	2573.	96.	96.	35.0	36.0
44.9689	105.5124	1978.	87.	77.	40.0	40.6
44.6526	105.5308	2248.	86.	86.	35.0	35.8
44.7167	105.5453	2179.	80.	83.	33.0	33.8
44.7670	105.5661	2185.	96.	84.	40.0	40.8
44.8264	105.8203	2349.	99.	89.	39.0	39.9
44.6586	105.6908	2957.	100.	107.	31.0	32.3
44.9581	105.4856	1942.	78.	76.	36.0	36.6
44.9804	105.3730	1643.	63.	66.	33.0	33.4
44.3403	105.4462	2457.	99.	92.	37.0	37.9
44.3403	105.4356	2438.	95.	92.	36.0	36.9
44.5382	105.3426	2493.	85.	93.	31.0	32.0

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.2489	105.7104	2982.	112.	108.	35.0	36.3
44.8267	105.6108	2225.	92.	85.	38.0	38.8
44.0155	105.3798	2811.	80.	103.	26.0	27.2
44.0482	105.5277	2926.	103.	107.	33.0	34.3
44.8395	105.1316	1220.	50.	51.	35.0	35.1
44.8789	105.2572	2174.	76.	83.	31.0	31.8
44.4590	105.5930	2569.	112.	96.	41.0	42.0
44.2734	105.5430	2515.	102.	94.	38.0	39.0
44.0988	105.5601	2920.	111.	106.	35.0	36.2
44.2315	105.2429	2835.	105.	104.	35.0	36.2
44.4438	105.2896	2611.	75.	97.	26.0	27.0
44.4438	105.2896	2611.	100.	97.	35.0	36.0
44.2775	105.6345	2890.	109.	105.	36.0	37.2
44.2757	105.3737	2969.	97.	108.	30.0	31.3
44.7220	105.3613	2316.	82.	88.	32.0	32.9
44.5812	105.4050	2170.	80.	83.	34.0	34.8
44.3024	105.1223	2438.	73.	92.	27.0	27.9
44.2130	105.3595	3027.	115.	110.	36.0	37.3
44.1728	105.7955	3749.	139.	130.	35.0	36.8
44.6500	105.8183	2548.	93.	95.	33.0	34.0
44.5947	105.8038	2670.	107.	99.	37.0	38.1
44.4039	105.3090	2669.	92.	99.	32.0	33.1
44.5859	105.6704	2446.	102.	92.	39.0	39.9
44.2223	105.4807	3246.	98.	116.	28.0	29.5
44.0327	105.3240	3114.	110.	112.	33.0	34.4
44.6202	105.7728	2557.	115.	95.	42.0	43.0
44.9539	105.9559	2306.	83.	87.	33.0	33.8
44.5345	105.9423	2879.	102.	105.	33.0	34.2
44.1469	105.3799	3119.	118.	112.	35.0	36.4
44.8095	105.8692	2436.	98.	92.	37.0	37.9
44.5001	105.2554	2426.	69.	91.	25.0	25.9
44.5188	105.8040	2799.	104.	103.	34.0	35.2
44.2049	105.4588	3224.	118.	115.	34.0	35.4
44.4162	105.2483	2521.	88.	94.	32.0	33.0
44.4132	105.2402	2471.	88.	93.	33.0	34.0
44.0229	105.3147	2642.	100.	98.	35.0	36.1
44.7858	105.5039	2125.	87.	82.	37.0	37.7
44.4251	105.2599	2533.	81.	95.	29.0	30.0
44.2655	105.4466	3077.	108.	111.	33.0	34.4
44.1237	105.4019	3194.	67.	114.	19.0	20.4
44.6650	105.1810	1756.	75.	70.	38.0	38.5
44.2110	105.4643	3281.	108.	117.	31.0	32.5
44.4776	105.1371	2298.	69.	87.	27.0	27.8
44.1642	105.4266	3200.	121.	115.	36.0	37.4
44.4949	105.2824	2462.	80.	92.	30.0	31.0
44.6177	105.7567	2521.	99.	94.	36.0	37.0
44.3884	105.2543	2550.	93.	95.	33.0	34.0
44.4656	105.2241	2405.	77.	91.	29.0	29.9
44.1211	105.4058	3185.	111.	114.	33.0	34.4
44.2350	105.2195	2744.	100.	101.	34.0	35.1
44.8789	105.2572	2174.	85.	83.	35.0	35.8
44.5454	105.3324	2470.	86.	93.	32.0	33.0
44.4801	105.5658	2545.	101.	95.	37.0	38.0
44.5779	105.4437	2239.	91.	85.	37.0	37.8

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.2252	105.5955	2856.	106.	104.	35.0	36.2
44.4349	105.4565	2264.	96.	86.	39.0	39.8
44.5527	105.4535	2197.	81.	84.	34.0	34.8
44.6106	105.4613	2103.	85.	81.	37.0	37.7
44.3478	105.4663	2448.	101.	92.	38.0	38.9
44.3184	105.4657	2488.	92.	93.	34.0	35.0
44.8870	105.9139	2671.	95.	99.	33.0	34.1
44.8153	105.5156	2027.	87.	78.	39.0	39.7
44.2281	105.2191	2743.	91.	101.	30.0	31.1
44.9554	105.9708	2305.	102.	87.	41.0	41.8
44.2909	105.4819	2555.	102.	95.	37.0	38.0
44.2624	105.5709	2769.	102.	102.	34.0	35.1
44.4373	105.5836	2496.	119.	93.	45.0	46.0
44.8860	105.8639	2278.	92.	87.	37.0	37.8
44.7461	105.8878	2440.	92.	92.	34.0	34.9
44.3369	105.3608	2368.	72.	89.	27.0	27.9
44.8055	105.6517	2254.	91.	86.	37.0	37.8
44.4828	105.1524	2325.	86.	88.	34.0	34.9
44.2846	105.7760	2976.	116.	108.	37.0	38.3
44.3296	105.4107	2411.	92.	91.	35.0	35.9
44.0225	105.4003	2778.	105.	102.	35.0	36.2
44.2896	105.3508	2880.	98.	105.	32.0	33.2
44.9370	105.7710	2177.	86.	83.	36.0	36.8
44.8057	105.5103	2104.	88.	81.	38.0	38.7
44.8966	105.6724	2139.	86.	82.	36.0	36.7
44.7384	105.6527	2301.	91.	87.	36.0	36.8
44.8969	105.4034	1768.	82.	70.	42.0	42.5
44.5490	105.8392	2756.	103.	101.	35.0	36.1
44.6963	105.6889	2426.	97.	91.	37.0	37.9
44.8231	105.6010	2208.	92.	84.	38.0	38.8
44.0390	105.6256	3190.	112.	114.	33.0	34.4
44.9041	105.6351	2149.	89.	82.	38.0	38.7
44.5724	105.6655	2478.	104.	93.	39.0	40.0
44.8528	105.8811	2443.	100.	92.	38.0	38.9
44.5007	105.0877	2233.	64.	85.	25.0	25.8
44.7940	105.7733	2357.	94.	89.	37.0	37.9
44.8120	105.6582	2252.	91.	86.	37.0	37.8
44.6837	105.8976	2603.	99.	97.	35.0	36.0
44.7732	105.4521	2106.	86.	81.	37.0	37.7
44.4501	105.3400	2652.	93.	98.	32.0	33.1
44.0907	105.1321	2746.	120.	101.	41.0	42.1
44.4733	105.8787	2783.	132.	102.	45.0	46.2
44.7436	105.4884	2140.	78.	82.	33.0	33.7
44.5650	105.6655	2441.	116.	92.	44.0	44.9
44.5835	105.4907	2149.	83.	82.	35.0	35.7
44.9756	105.5948	2093.	74.	81.	32.0	32.7
44.3517	105.3116	2806.	85.	103.	28.0	29.2
44.2690	105.6548	2938.	124.	107.	40.0	41.3
44.8345	105.5618	2130.	82.	82.	35.0	35.7
44.9640	105.5589	2066.	79.	80.	35.0	35.7
44.6070	105.9752	2764.	120.	102.	41.0	42.1
44.9275	105.1273	1323.	65.	55.	44.0	44.2
43.6231	105.3843	3298.	123.	118.	35.0	36.5
44.5614	105.6699	2448.	99.	92.	37.0	37.9

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.4631	105.1032	2340.	84.	89.	33.0	33.9
44.8559	105.6661	2170.	89.	83.	37.0	37.8
44.7380	105.5250	2165.	79.	83.	33.0	33.8
44.9821	105.3272	1577.	70.	64.	39.0	39.4
44.7234	105.9120	2666.	92.	99.	32.0	33.1
44.9336	105.2764	1615.	77.	65.	43.0	43.4
44.3293	105.4611	2469.	100.	93.	38.0	39.0
44.3735	105.2660	2652.	99.	98.	34.0	35.1
44.4959	105.5722	2434.	99.	91.	38.0	38.9
44.3703	105.3413	2856.	77.	104.	25.0	26.2
44.3459	105.6340	2704.	116.	100.	40.0	41.1
44.6111	105.6651	2536.	121.	95.	45.0	46.0
44.9584	105.7384	2192.	89.	84.	37.0	37.8
44.6654	105.9589	2632.	103.	98.	36.0	37.1
44.1452	105.4867	2759.	122.	102.	42.0	43.1
44.4423	105.0370	2266.	61.	86.	24.0	24.8
44.9995	105.0514	1289.	46.	54.	30.0	30.2
44.4607	105.0724	2286.	96.	87.	39.0	39.8
44.7673	105.0017	1914.	86.	75.	41.0	41.6
44.5291	105.0830	2240.	77.	85.	31.0	31.8
44.5800	105.0524	2209.	75.	84.	31.0	31.8
44.2997	105.0755	2414.	80.	91.	30.0	30.9
44.7206	105.0536	2027.	84.	78.	38.0	38.7
44.5761	105.0625	2192.	80.	84.	33.0	33.8
44.4977	105.0526	1760.	59.	70.	29.0	29.5
44.4868	105.0468	2294.	56.	87.	21.0	21.8
44.9573	105.0598	1208.	60.	51.	43.0	43.1
44.0128	105.2325	3109.	130.	112.	40.0	41.4
44.0424	105.1615	2914.	123.	106.	40.0	41.2
44.0511	105.4811	3354.	135.	119.	38.0	39.5
44.0639	105.1926	2856.	103.	104.	33.0	34.2
44.3271	105.2806	2801.	99.	103.	33.0	34.2
44.5329	105.7415	2604.	126.	97.	45.0	46.0
44.4699	105.2796	2512.	87.	94.	32.0	33.0
44.7100	105.3401	2335.	98.	88.	38.0	38.9
44.4950	105.3955	2759.	88.	102.	29.0	30.1
44.3932	105.2287	2530.	99.	94.	36.0	37.0
44.6250	105.4696	2074.	81.	80.	35.0	35.7
44.3667	105.3071	2740.	91.	101.	30.0	31.1
44.8784	105.7499	2266.	97.	86.	39.0	39.8
44.8203	105.8546	2438.	94.	92.	35.0	35.9
44.5340	105.2115	2301.	80.	87.	31.0	31.8
44.9748	105.8591	2260.	106.	86.	43.0	43.8
44.5734	105.1898	2316.	88.	88.	34.0	34.9
44.6366	105.7018	2551.	101.	95.	36.0	37.0
44.8139	105.6924	2265.	94.	86.	38.0	38.8
44.5646	105.8835	2752.	120.	101.	41.0	42.1
44.3644	105.3103	2776.	89.	102.	30.0	31.2
44.6455	105.8932	2656.	117.	98.	41.0	42.1
44.7207	105.6706	2347.	76.	89.	29.0	29.9
44.1132	105.5169	3351.	116.	119.	33.0	34.5
44.5525	105.0938	2231.	85.	85.	35.0	35.8
44.2364	105.2427	2803.	101.	103.	34.0	35.2
44.2624	105.3632	2957.	103.	107.	32.0	33.3

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.5357	105.8207	3302.	127.	118.	36.0	37.5
44.7102	105.6284	2280.	87.	87.	35.0	35.8
44.0698	105.5434	3510.	114.	124.	30.0	31.6
44.1457	105.1514	2763.	108.	102.	37.0	38.1
44.7910	105.6053	2240.	82.	85.	33.0	33.8
44.9048	105.8279	2365.	99.	89.	38.0	38.9
44.3458	105.1537	2503.	58.	94.	20.0	21.0
44.3426	105.1583	2526.	71.	94.	25.0	26.0
44.8403	105.7465	2815.	104.	103.	34.0	35.2
44.2340	105.3190	2847.	130.	104.	43.0	44.2
44.4748	105.1078	2271.	81.	86.	32.0	32.8
44.8524	105.7505	2288.	91.	87.	36.0	36.8
44.4355	105.1338	2376.	54.	90.	20.0	20.9
44.8340	105.7595	2332.	100.	88.	40.0	40.9
44.8328	105.7561	2332.	99.	88.	39.0	39.9
44.9543	105.5247	2107.	80.	81.	34.0	34.7
44.9301	105.8356	2880.	84.	105.	26.0	27.2
44.8712	105.7932	2320.	96.	88.	38.0	38.9
44.5088	105.2682	2430.	79.	91.	29.0	29.9
44.2757	105.2496	2725.	106.	100.	36.0	37.1
44.5953	105.9846	2893.	110.	106.	36.0	37.2
44.0190	105.4414	3319.	138.	118.	40.0	41.5
44.1071	105.5227	3395.	113.	120.	31.0	32.6
44.3904	105.4893	2495.	104.	93.	39.0	40.0
44.5250	105.1378	2278.	74.	87.	29.0	29.8
44.7098	105.5923	2243.	81.	85.	33.0	33.8
44.1418	105.5435	3338.	104.	119.	29.0	30.5
44.0120	105.3131	3109.	134.	112.	41.0	42.4
44.5899	105.1096	2210.	86.	84.	36.0	36.8
44.6661	105.5151	2176.	86.	83.	36.0	36.8
44.8894	105.5840	2115.	90.	81.	39.0	39.7
44.2618	105.6245	2898.	22.	106.	5.0	6.2
44.1701	105.6357	2987.	110.	108.	34.0	35.3
44.5597	105.3983	2050.	79.	79.	35.0	35.7
44.6471	105.6286	2304.	101.	87.	40.0	40.8
44.9232	105.9193	2354.	91.	89.	35.0	35.9
44.9421	105.9234	2316.	96.	88.	38.0	38.9
44.9729	105.1790	1493.	55.	61.	32.0	32.3
44.9396	105.1080	1430.	64.	59.	39.0	39.3
44.9110	105.6698	2161.	94.	83.	40.0	40.8
44.9190	105.8495	2323.	100.	88.	40.0	40.9
44.7700	105.6518	2365.	85.	89.	33.0	33.9
44.7782	105.7208	2418.	98.	91.	37.0	37.9
44.4491	105.5410	2502.	100.	94.	37.0	38.0
44.3527	105.7043	2939.	118.	107.	38.0	39.3
44.9045	105.8609	2843.	91.	104.	29.0	30.2
44.4595	105.9131	2892.	125.	106.	41.0	42.2
44.6070	105.2525	2317.	89.	88.	35.0	35.9
44.0193	105.4303	3328.	126.	118.	36.0	37.5
44.9198	105.7133	2264.	84.	86.	34.0	34.8
44.6878	105.6081	2354.	80.	89.	31.0	31.9
44.8762	105.7898	2395.	88.	90.	33.0	33.9
44.8318	105.4029	1829.	79.	72.	39.0	39.5
44.8825	105.3180	1786.	83.	71.	42.0	42.5

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.8274	105.8657	2380.	100.	90.	39.0	39.9
44.4241	105.4483	2271.	86.	86.	35.0	35.8
44.3076	105.4655	2510.	98.	94.	36.0	37.0
44.4672	105.4928	2300.	92.	87.	37.0	37.8
44.4158	105.4971	2438.	96.	92.	36.0	36.9
44.4610	105.3996	2276.	78.	86.	31.0	31.8
44.3697	105.2861	2182.	78.	83.	32.0	32.8
44.6510	105.1612	1742.	60.	69.	30.0	30.5
44.4072	105.2342	2530.	86.	94.	31.0	32.0
44.8630	105.0914	1710.	89.	68.	47.0	47.5
44.5486	105.8999	2307.	87.	87.	35.0	35.8
44.1649	105.8214	3193.	118.	114.	35.0	36.4
44.3196	105.2863	2818.	101.	103.	34.0	35.2
44.6846	105.5988	2234.	90.	85.	37.0	37.8
44.8371	105.6321	2185.	86.	84.	36.0	36.8
44.5818	105.1855	2275.	81.	86.	32.0	32.8
44.9014	105.8590	2306.	91.	87.	36.0	36.8
44.7952	105.5862	2195.	87.	84.	36.0	36.8
44.4082	105.1386	2454.	75.	92.	27.0	27.9
44.4532	105.5197	2398.	102.	90.	40.0	40.9
44.0296	105.4414	3301.	104.	118.	29.0	30.5
44.8008	105.5095	2095.	73.	81.	31.0	31.7
44.4772	105.0944	2308.	75.	88.	29.0	29.9
44.5966	105.7783	2636.	105.	98.	37.0	38.1
44.0727	105.5427	2929.	112.	107.	36.0	37.3
44.3841	105.4555	2357.	85.	89.	33.0	33.9
44.3219	105.4511	2476.	103.	93.	39.0	40.0
44.7095	105.5505	2111.	89.	81.	38.0	38.7
44.3138	105.1279	2464.	68.	92.	25.0	26.0
44.2750	105.5336	2708.	86.	100.	29.0	30.1
44.9380	105.7808	2127.	86.	82.	37.0	37.7
44.8419	105.5698	2159.	83.	83.	35.0	35.8
44.2723	105.2442	2719.	80.	100.	27.0	28.1
44.9954	105.8741	2294.	76.	87.	30.0	30.8
44.2785	105.5279	2697.	103.	100.	36.0	37.1
44.7719	105.5912	2195.	86.	84.	36.0	36.8
44.6403	105.2819	2262.	90.	86.	36.0	36.8
44.2431	105.5278	3239.	104.	116.	30.0	31.5
44.8983	105.7771	2287.	94.	87.	38.0	38.8
44.2964	105.5571	2699.	96.	100.	33.0	34.1
44.3985	105.5257	2455.	107.	92.	41.0	41.9
44.2784	105.5380	2710.	88.	100.	30.0	31.1
44.6804	105.7628	2685.	99.	99.	34.0	35.1
44.7167	105.5097	2263.	88.	86.	36.0	36.8
44.9905	105.1929	1507.	75.	61.	45.0	45.3
44.6900	105.3953	2013.	96.	78.	44.0	44.7
44.6224	105.5370	2210.	92.	84.	38.0	38.8
44.5137	105.1830	2323.	85.	88.	33.0	33.9
44.6109	105.4341	2181.	67.	83.	27.0	27.8
44.7873	105.5312	2248.	99.	86.	41.0	41.8
44.8379	105.6564	2179.	83.	83.	34.0	34.8
44.8137	105.3965	1821.	76.	72.	37.0	37.5
44.7193	105.3299	2318.	101.	88.	40.0	40.9
44.8999	105.5234	1962.	95.	76.	44.0	44.6

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.5151	105.9024	2865.	113.	105.	37.0	38.2
44.4912	105.6503	2609.	84.	97.	29.0	30.0
44.6040	105.4437	2179.	95.	83.	40.0	40.8
44.4365	105.6549	3223.	150.	115.	44.0	45.4
44.9032	105.5187	1984.	85.	77.	39.0	39.6
44.5619	105.5946	2442.	90.	92.	34.0	34.9
44.2850	105.1275	2509.	65.	94.	23.0	24.0
44.3148	105.4346	2577.	96.	96.	35.0	36.0
44.9076	105.8340	2335.	101.	88.	40.0	40.9
44.4947	105.2485	2403.	76.	91.	28.0	28.9
44.4306	105.4771	2338.	100.	88.	40.0	40.9
44.3554	105.2500	2664.	94.	99.	33.0	34.1
44.3632	105.1995	2518.	118.	94.	44.0	45.0
44.3655	105.2498	2628.	98.	98.	34.0	35.1
44.4003	105.1325	2460.	98.	92.	37.0	37.9
44.5395	105.7232	2687.	110.	99.	38.0	39.1
44.6336	105.9248	2746.	105.	101.	35.0	36.1
44.5672	105.9051	2854.	104.	104.	34.0	35.2
44.2012	105.4193	3167.	58.	114.	16.0	17.4
44.4705	105.2874	2545.	84.	95.	30.0	31.0
44.1759	105.4145	3179.	116.	114.	34.0	35.4
44.1444	105.3196	3048.	115.	110.	36.0	37.3
44.9004	105.8241	2313.	95.	88.	38.0	38.9
44.8968	105.8180	2348.	100.	89.	39.0	39.9
44.6143	105.3937	2198.	87.	84.	36.0	36.8
44.1129	105.5482	2986.	115.	108.	36.0	37.3
44.6523	105.5723	2266.	106.	86.	44.0	44.8
44.9911	105.2611	2108.	72.	81.	30.0	30.7
44.3666	105.3704	2850.	84.	104.	27.0	28.2
44.2335	105.0309	2516.	81.	94.	29.0	30.0
44.5185	105.0247	1676.	56.	67.	29.0	29.4
44.3473	105.0414	2323.	104.	88.	42.0	42.9
44.8932	105.1081	1768.	65.	70.	32.0	32.5
44.9721	105.6311	2123.	93.	82.	40.0	40.7
44.6840	105.8562	2537.	96.	95.	35.0	36.0
44.9648	105.9928	2310.	79.	88.	31.0	31.9
44.1705	105.5856	2893.	103.	106.	33.0	34.2
44.5259	105.5686	2393.	96.	90.	37.0	37.9
44.6528	105.6239	2285.	94.	87.	38.0	38.8
44.2382	105.3548	2982.	97.	108.	30.0	31.3
44.4784	105.9086	2800.	127.	103.	43.0	44.2
44.1838	105.9785	3277.	132.	117.	38.0	39.5
44.7840	105.7751	2458.	90.	92.	33.0	33.9
44.8432	105.2174	1720.	77.	68.	40.0	40.5
44.7630	105.6086	2324.	79.	88.	31.0	31.9
44.4564	105.1333	2309.	73.	88.	28.0	28.9
44.3341	105.1730	2531.	82.	95.	30.0	31.0
44.3374	105.2552	2812.	103.	103.	34.0	35.2
44.3589	105.4515	2412.	99.	91.	38.0	38.9
44.9966	105.4660	1829.	83.	72.	41.0	41.5
44.9444	105.3373	1634.	76.	65.	42.0	42.4

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.3032	105.7703	2933.	116.	107.	37.0	38.3
44.4188	105.2000	2453.	95.	92.	35.0	35.9
44.9639	105.5081	1998.	85.	78.	39.0	39.6
44.5661	105.2973	2362.	94.	89.	36.0	36.9
44.3642	105.1071	2469.	62.	93.	22.0	23.0
44.9882	105.1030	1417.	51.	58.	31.0	31.3
44.5801	105.5781	2332.	93.	88.	37.0	37.9
44.7156	105.5922	2177.	89.	83.	37.0	37.8
44.8895	105.6699	2135.	86.	82.	36.0	36.7

CROOK COUNTY, WYOMING

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 63
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 5.9317 B= 0.0524 C=-.0000102R
TOTAL SUM OF SQUARES (SST)= 13141.4
SUM OF SQUARES DUE TO REGRESSION (SSR)= 5713.1
SUM OF SQUARES DUE TO DEVIATION (SSD)= 7428.3
VARIANCE OF TEMPERATURES= 212.0
CORRELATION COEFFICIENT (R)= 0.6594
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.4347
RANGE OF DEPTHS IS 482.0 TO 2541.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.5004	104.9457	1566.	80.	63.	46.0	46.2
44.6584	105.6788	2403.	92.	72.	35.0	35.5
44.4931	104.9035	936.	33.	46.	27.0	27.0
44.7747	104.9959	1890.	74.	68.	35.0	35.3
44.2120	104.9440	2245.	54.	72.	21.0	21.4
44.5553	104.9916	2059.	71.	70.	31.0	31.4
44.5631	104.8286	518.	39.	30.	61.0	60.8
44.6172	104.9857	2006.	73.	70.	33.0	33.4
44.7097	104.9961	1900.	88.	68.	42.0	42.3
44.5626	104.9949	2069.	64.	70.	28.0	28.4
44.4790	104.9833	2060.	77.	70.	34.0	34.4
44.4887	104.9846	2228.	79.	72.	32.0	32.4
44.4780	104.9891	2152.	58.	71.	24.0	24.4
44.4476	104.9515	1697.	87.	65.	47.0	47.2
44.4780	104.9891	2152.	58.	71.	24.0	24.4
44.4790	104.9833	2060.	77.	70.	34.0	34.4
44.4887	104.9846	2228.	79.	72.	32.0	32.4
44.4476	104.9515	1697.	87.	65.	47.0	47.2
44.4165	104.7914	482.	27.	29.	40.0	39.8
44.2122	104.9772	2259.	63.	72.	25.0	25.4
44.2770	104.9290	2008.	75.	70.	34.0	34.4
44.2890	104.8874	1784.	88.	67.	45.0	45.3
44.6663	104.9703	1951.	68.	69.	31.0	31.3
44.5332	104.9558	2013.	60.	70.	26.0	26.4
44.4888	104.9951	2127.	66.	71.	27.0	27.4
44.5525	104.9930	2088.	66.	71.	28.0	28.4
44.7856	104.9451	1177.	62.	53.	46.0	46.1
44.4567	104.9951	2106.	75.	71.	32.0	32.4
44.5525	104.9930	2088.	66.	71.	28.0	28.4
44.4567	104.9951	2106.	75.	71.	32.0	32.4
44.4418	104.9254	1455.	59.	60.	35.0	35.2
44.6268	104.9556	2541.	72.	73.	25.0	25.5
44.2918	104.8929	1826.	72.	67.	35.0	35.3
44.2980	104.8844	1732.	62.	66.	31.0	31.3
44.3032	104.8969	1934.	65.	69.	30.0	30.3
44.3031	104.9780	2114.	56.	71.	23.0	23.4
44.5586	104.9660	2013.	64.	70.	28.0	28.4
44.5331	104.9969	2145.	88.	71.	38.0	38.4

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.3719	104.9352	1448.	61.	60.	37.0	37.2
44.4929	104.9339	1450.	57.	60.	34.0	34.2
44.5295	104.9464	1971.	57.	69.	25.0	25.3
44.5964	104.9922	2040.	66.	70.	29.0	29.4
44.5915	104.9968	2057.	72.	70.	31.0	31.4
44.5006	104.9497	1660.	50.	65.	26.0	26.2
44.2268	104.9036	1868.	60.	68.	28.0	28.3
44.2231	104.9341	2172.	62.	71.	25.0	25.4
44.6051	104.9449	1908.	78.	68.	37.0	37.3
44.2337	104.9136	1939.	50.	69.	22.0	22.3
44.7599	104.9903	1862.	59.	68.	27.0	27.3
44.5735	104.9910	2061.	69.	70.	30.0	30.4
44.1903	104.8186	787.	36.	41.	37.0	36.9
44.3179	104.8838	1591.	56.	63.	31.0	31.2
44.5764	104.9654	2018.	60.	70.	26.0	26.4
44.2988	104.9283	1880.	68.	68.	32.0	32.3
44.4420	104.9295	1529.	76.	62.	45.0	45.2
44.5402	104.9502	1977.	64.	69.	29.0	29.3
44.6335	104.9600	1946.	66.	69.	30.0	30.3
44.8509	104.1389	1098.	41.	51.	29.0	29.0
44.4276	104.9299	1086.	38.	51.	28.0	28.0
44.1983	104.8225	846.	39.	43.	37.0	36.9
44.7334	104.9698	1814.	76.	67.	38.0	38.3
44.3181	104.8764	1526.	56.	62.	32.0	32.2
44.5320	104.9765	2088.	91.	71.	40.0	40.4

JOHNSON AND SHERIDEN COUNTIES, WYOMING

ATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 15
QUADRATIC LEAST SQUARES COEFFICIENTS ARE,
A= 6.0697 B= 0.0478 C=-.00000475
TOTAL SUM OF SQUARES (SST)= 4036.6
SUM OF SQUARES DUE TO REGRESSION (SSR)= 462.1
SUM OF SQUARES DUE TO DEVIATION (SSD)= 3574.5
VARIANCE OF TEMPERATURES= 288.3
CORRELATION COEFFICIENT (R)= 0.3383
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.1145
RANGE OF DEPTHS IS 2348.0 TO 3544.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
44.5975	106.1213	3460.	119.	115.	32.0	33.4
44.8328	106.4503	2971.	105.	106.	33.0	34.1
44.7892	106.3018	2896.	100.	105.	32.0	33.0
44.8303	106.3538	2947.	97.	106.	30.0	31.1
44.2237	106.2490	3544.	134.	116.	36.0	37.4
44.5070	106.2545	3133.	59.	109.	16.0	17.2
44.5237	106.0520	3005.	111.	107.	34.0	35.1
44.4734	106.0421	3044.	104.	108.	31.0	32.1
44.4013	106.1958	3311.	118.	112.	33.0	34.3
44.8328	106.4652	2981.	108.	106.	34.0	35.1
44.9840	106.0245	2348.	94.	92.	37.0	37.7
44.9067	106.7432	2890.	107.	105.	34.0	35.0
44.7005	106.4968	3146.	105.	109.	31.0	32.2
44.8368	106.5112	2942.	115.	106.	37.0	38.1
44.8011	106.1053	2669.	125.	100.	44.0	44.9

CARTER COUNTY, MONTANA

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 18
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 6.2110 B= 0.0458 C=-.00000382
TOTAL SUM OF SQUARES (SST)= 7820.4
SUM OF SQUARES DUE TO REGRESSION (SSR)= 5418.3
SUM OF SQUARES DUE TO DEVIATION (SSD)= 2402.1
VARIANCE OF TEMPERATURES= 460.0
CORRELATION COEFFICIENT (R)= 0.8324
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.6928
RANGE OF DEPTHS IS 721.0 TO 2736.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
45.7327	104.9205	1452.	85.	65.	52.0	52.2
45.6857	104.0944	1385.	61.	62.	38.0	38.2
45.4220	104.1276	1234.	48.	57.	32.0	32.1
45.3652	104.1270	1186.	45.	55.	31.0	31.1
45.9872	104.8677	1658.	72.	72.	38.0	38.3
45.3504	104.1629	1114.	47.	52.	35.0	35.1
45.3872	104.1224	1204.	86.	56.	65.0	65.1
45.3718	104.9566	1226.	63.	57.	44.0	44.1
45.0643	104.8609	873.	41.	43.	38.0	37.9
45.3329	104.6386	721.	35.	37.	38.0	37.9
45.4288	104.7573	1060.	44.	50.	33.0	33.0
45.2915	104.7887	876.	43.	43.	40.0	39.9
45.3177	104.2391	1011.	44.	49.	36.0	36.0
45.3790	104.2296	1112.	46.	52.	33.0	33.1
45.4725	104.6541	1084.	44.	51.	33.0	33.0
45.8772	104.1188	2736.	108.	103.	36.0	36.8
45.1745	104.4061	1055.	47.	50.	37.0	37.0
45.7764	104.0531	2716.	94.	102.	31.0	31.8

BIG HORN COUNTY, MONTANA

TATISTICAL SUMMARY
.OTAL NUMBER OF DATA POINTS= 13
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 6.9893 B= 0.0558 C=-.00000839
TOTAL SUM OF SQUARES (SST)= 975.0
SUM OF SQUARES DUE TO REGRESSION (SSR)= 256.4
SUM OF SQUARES DUE TO DEVIATION (SSD)= 718.6
VARIANCE OF TEMPERATURES= 81.3
CORRELATION COEFFICIENT (R)= 0.5128
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.2629
RANGE OF DEPTHS IS 1775.0 TO 2633.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
45.3652	106.2523	2347.	89.	92.	35.0	35.7
45.7397	106.5593	1775.	75.	80.	37.0	37.4
45.6259	106.3184	1990.	92.	85.	42.0	42.5
45.4267	106.7152	2306.	111.	91.	45.0	45.7
45.3704	106.3539	2249.	76.	90.	30.0	30.6
45.0278	106.0619	2470.	91.	94.	34.0	34.8
45.4707	106.0890	2012.	84.	85.	38.0	38.5
45.4961	106.0885	2005.	86.	85.	38.0	38.5
45.3513	106.2366	2201.	89.	89.	37.0	37.6
45.0169	106.1577	2633.	95.	96.	33.0	33.8
45.0169	106.0172	2522.	93.	94.	34.0	34.8
45.2814	106.0332	2213.	87.	89.	36.0	36.6
45.1331	106.2246	2433.	94.	93.	35.0	35.7

POWDER RIVER COUNTY, MONTANA

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 69
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 6.4796 B= 0.0334 C=0.00000111
TOTAL SUM OF SQUARES (SST)= 9043.2
SUM OF SQUARES DUE TO REGRESSION (SSR)= 5057.4
SUM OF SQUARES DUE TO DEVIATION (SSD)= 3985.8
VARIANCE OF TEMPERATURES= 133.0
CORRELATION COEFFICIENT (R)= 0.7478
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.5592
RANGE OF DEPTHS IS 1243.0 TO 2246.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
45.0339	105.7679	2207.	80.	86.	33.0	33.6
45.1235	105.6689	1991.	75.	77.	34.0	34.5
45.3045	105.2996	1536.	66.	60.	37.0	37.3
45.1432	105.3593	1637.	62.	64.	33.0	33.3
45.0853	105.3866	1643.	63.	64.	33.0	33.3
45.2210	105.2431	1550.	54.	61.	29.0	29.3
45.0427	105.3455	1558.	63.	61.	35.0	35.3
45.6105	105.1473	1453.	54.	57.	31.0	31.2
45.0031	105.1671	1950.	97.	76.	46.0	46.5
45.0272	105.4740	1853.	79.	72.	38.0	38.4
45.0745	105.4589	1783.	62.	70.	30.0	30.4
45.7866	105.8371	1845.	70.	72.	33.0	33.4
45.2457	105.3101	1545.	67.	61.	38.0	38.3
45.0024	105.1761	1407.	67.	56.	42.0	42.2
45.2131	105.1559	1494.	59.	59.	34.0	34.2
45.0424	105.4675	1825.	79.	71.	39.0	39.4
45.0279	105.3293	1571.	62.	62.	34.0	34.3
45.1512	105.3857	1686.	67.	66.	35.0	35.3
45.0325	105.4929	1869.	77.	73.	37.0	37.4
45.0936	105.4064	1653.	70.	65.	37.0	37.3
45.1046	105.4677	1838.	72.	72.	35.0	35.4
45.0363	105.2779	1588.	54.	62.	29.0	29.3
45.5417	105.5663	1836.	76.	71.	37.0	37.4
45.1771	105.8278	2150.	76.	83.	31.0	31.6
45.0234	105.7319	2200.	85.	85.	35.0	35.6
45.2927	105.1556	1490.	60.	59.	35.0	35.2
45.2021	105.0900	1519.	68.	60.	40.0	40.2
45.1726	105.2789	1527.	52.	60.	28.0	28.3
45.1809	105.2223	1489.	53.	59.	30.0	30.2
45.2497	105.2439	1548.	59.	61.	33.0	33.3
45.1627	105.2379	1450.	64.	57.	38.0	38.2
45.2134	105.1306	1491.	57.	59.	32.0	32.2
45.1912	105.3256	1562.	60.	61.	33.0	33.3
45.0031	105.4219	1768.	82.	69.	41.0	41.4
45.0899	105.2838	1512.	53.	59.	30.0	30.2
45.0865	105.4373	1746.	71.	68.	36.0	36.4
45.0124	105.3047	1597.	68.	63.	38.0	38.3

Continued on next page

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
45.1064	105.6951	2168.	86.	84.	36.0	36.6
45.4341	105.3558	1701.	61.	66.	31.0	31.3
45.1750	105.6733	2126.	80.	82.	34.0	34.5
45.6147	105.0181	1454.	63.	57.	37.0	37.2
45.8085	105.8740	1826.	67.	71.	32.0	32.4
45.9017	105.1274	1671.	55.	65.	28.0	28.3
45.8888	105.8167	1791.	79.	70.	40.0	40.4
45.8050	105.3730	1700.	78.	66.	41.0	41.3
45.1040	105.0336	1427.	49.	56.	29.0	29.2
45.0023	105.0339	1243.	59.	50.	41.0	41.1
45.1009	105.1658	1414.	48.	56.	28.0	28.2
45.0936	105.4371	1757.	68.	69.	34.0	34.4
45.1044	105.3961	1762.	67.	69.	33.0	33.4
45.0171	105.4372	1768.	63.	69.	31.0	31.4
45.6113	105.2150	1619.	64.	63.	34.0	34.3
45.7460	105.1574	1628.	67.	64.	36.0	36.3
45.2492	105.4010	2246.	75.	87.	30.0	30.6
45.7012	105.3620	1759.	73.	69.	36.0	36.4
45.6573	105.5298	1763.	74.	69.	37.0	37.4
45.1078	105.0951	1402.	59.	55.	37.0	37.2
45.1151	105.1206	1432.	32.	57.	17.0	17.2
45.0681	105.1712	1398.	64.	55.	40.0	40.2
45.0751	105.0540	1485.	49.	58.	28.0	28.2
45.1297	105.3393	1747.	54.	68.	26.0	26.4
45.0319	105.0795	1329.	50.	53.	32.0	32.2
45.1080	105.1658	1524.	50.	60.	28.0	28.3
45.1460	105.6794	2114.	89.	82.	38.0	38.5
45.0067	105.2520	1486.	64.	59.	37.0	37.2
4[illegible]519	105.0243	1401.	48.	55.	28.0	28.2
45.[illegible]12	105.1686	1591.	74.	62.	41.0	41.3
45.1[illegible]6	105.0899	1645.	60.	64.	32.0	32.3
45.1[illegible]7	105.1860	1439.	55.	57.	33.0	33.2

Continued on next page

CUSTER AND PRAIRIE COUNTIES, MONTANA

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 12
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 6.4547 B= 0.0426 C=-.00000276
TOTAL SUM OF SQUARES (SST)= 5134.1
SUM OF SQUARES DUE TO REGRESSION (SSR)= 3033.1
SUM OF SQUARES DUE TO DEVIATION (SSD)= 2101.0
VARIANCE OF TEMPERATURES= 466.7
CORRELATION COEFFICIENT (R)= 0.7686
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.5908
RANGE OF DEPTHS IS 1575.0 TO 2988.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
46.9467	105.8549	2988.	102.	109.	31.0	32.1
46.9610	105.7008	1740.	73.	72.	37.0	37.4
46.9499	105.3259	1760.	66.	73.	32.0	32.4
46.3961	105.4206	1737.	74.	72.	37.0	37.4
46.0021	105.0873	1575.	70.	67.	39.0	39.3
46.3109	105.0120	1878.	78.	77.	37.0	37.5
46.0578	105.2456	1620.	80.	68.	44.0	44.3
46.2404	105.9073	1676.	85.	70.	45.0	45.4
46.4569	105.6337	1635.	32.	69.	14.0	14.3
46.5535	105.9361	1657.	76.	69.	41.0	41.4
46.7139	105.5932	2794.	116.	104.	38.0	39.0
46.4806	105.1551	2946.	105.	108.	33.0	34.1

HARDING COUNTY, SOUTH DAKOTA

STATISTICAL SUMMARY
TOTAL NUMBER OF DATA POINTS= 35
QUADRATIC LEAST SQUARES COEFFICIENTS ARE.
A= 6.0106 B= 0.0495 C=-.00000320
TOTAL SUM OF SQUARES (SST)= 21169.1
SUM OF SQUARES DUE TO REGRESSION (SSR)= 18492.4
SUM OF SQUARES DUE TO DEVIATION (SSD)= 2676.8
VARIANCE OF TEMPERATURES= 622.6
CORRELATION COEFFICIENT (R)= 0.9346
GOODNESS OF FIT (2ND DEGREE POLYNOMIAL)= 0.8736
RANGE OF DEPTHS IS 961.0 TO 2876.0

LATITUDE	LONGITUDE	DEPTH	CORRECTED TEMPERATURE	ESTIMATED TEMPERATURE	AVERAGE GRADIENT	CORRECTED GRADIENT
45.4877	103.5987	2688.	127.	116.	44.0	44.8
45.7875	103.5274	2659.	138.	115.	48.0	48.8
45.9169	103.7464	2768.	120.	119.	40.0	40.9
45.7734	103.7341	2684.	104.	116.	36.0	36.8
45.7734	103.7341	2684.	104.	116.	36.0	36.8
45.2153	103.3311	1207.	62.	61.	44.0	44.1
45.2336	103.9028	1158.	56.	59.	41.0	41.1
45.8594	103.7657	2761.	107.	118.	36.0	36.9
45.4576	103.2175	2552.	108.	112.	39.0	39.8
45.8424	103.4813	2786.	116.	119.	38.0	38.9
45.2861	103.2697	1295.	83.	65.	57.0	57.1
45.6829	103.4963	2591.	122.	113.	44.0	44.8
45.9060	103.5248	2785.	125.	119.	42.0	42.9
45.9406	103.5257	2813.	133.	120.	44.0	44.9
45.7642	103.2164	2618.	115.	114.	41.0	41.8
45.8891	103.4328	2774.	105.	119.	35.0	35.9
45.8572	103.5740	2807.	120.	120.	40.0	40.9
45.2807	103.3420	2211.	103.	100.	42.0	42.6
45.4180	103.9382	2548.	96.	111.	35.0	35.8
45.7556	103.8334	2621.	101.	114.	35.0	35.8
45.8916	103.7760	2682.	109.	116.	37.0	37.8
45.1751	103.3466	1111.	45.	57.	33.0	33.1
45.1538	103.6674	988.	55.	52.	47.0	47.0
45.9742	103.4368	2827.	118.	120.	39.0	39.9
45.9267	103.3605	2825.	121.	120.	40.0	40.9
45.9050	103.5335	2776.	122.	119.	41.0	41.9
45.9183	103.7923	2712.	115.	117.	39.0	39.8
45.9363	103.1814	2876.	129.	122.	42.0	42.9
45.1829	103.7545	961.	48.	51.	41.0	41.0
45.9464	103.6415	2822.	130.	120.	43.0	43.9
45.9704	103.3208	2875.	116.	122.	37.0	37.9
45.9675	103.5494	2809.	123.	120.	40.0	40.9
45.9900	103.7293	2862.	120.	121.	39.0	39.9
45.9636	103.5500	2822.	123.	120.	40.0	40.9
45.9927	103.7246	2866.	124.	122.	40.0	40.9